University of Toronto

P78-C506.(07)
U.81

COMPUTER SCIENCE NEWSLETTER

No. 75

Edited by Mr. C. Alan Ford

Date April 30, 1971

IN THIS ISSUE:

GENERAL NEWS

The Suggestion Box 1
System Performance Measurement 1
Transparency Feature for Remote Terminals 4
Newsletter Errata Corrected by System Status Bulletins 5
SSB's in Effect at April 15, 1971 6
Recent Acquisitions in the Department of Computer Science Library 6
Data Acquisition Computer Available 8

PRODUCTS AND SERVICES NEWS

The WATFIV Processor for the High Speed Job Stream 9
Forthcoming Computer Centre Courses 10
Procedures for Use With Complex Matrices 12
New Subroutines in ICS Library 13
Note About the QR Algorithm 13
Special Printer Forms 13
Production Data 14
Column Binary Card to Tape 15
Use of SPEC Instead of Special Request Form 15
Conversational Programming System - Remote Job Entry 15
Administrative Terminal System 15
ATS Sign-on Procedure 15
Activities in Production Area 16
Credit Request Summary 16

TECHNICAL TIPS

Using On-line Subprogram Libraries 19
System 360 Operating System SORT/MERGE 20

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THE SUGGESTION BOX

The suggestion boxes continue to provide queries and suggestions of definite value to the staff of the Computer Centre. The crop dating from mid-March to mid-April numbers about forty items. Space precludes a full review of them here, although the staff of the Centre continue to reply to most of them directly.

Over a dozen items were repetitive of issues already discussed in these pages. Most of these were concerned with operational practices and facilities. The repetition is a valuable indicator that these issues are of more than passing interest.

Eight items of some novelty were received which specifically concern the Management of Input/Output Services. These are being given very active attention by the staff.

Five items concerned policies or procedures which are under the administration of terminal sponsors. These have been forwarded to the appropriate authorities. The subject matter concentrated on hours and style of service.

Another ten items addressed problems such as software, documentation or administrative difficulties. One of these proposed that the Centre offer a monthly prize for the suggestion which would do most to improve system efficiency. UTCC is intrigued by the idea, but we wonder how to judge suggestions fairly enough. The author, a prolific source of suggestions, has been asked to consider how such a scheme might be administered.

The same author had suggested obtaining time on the Sigma 7 computer at the Library. The intended purpose, it proves, was to make available a different type of time-shared system than CPS, specifically one which provides a large core region on a swapping basis. CP-67/CMS and the still-to-be released OS Time Sharing Option exemplify such systems. In this case, the author has been encouraged to elaborate upon the type of system he would favour.

Queries about binary card punching facilities and about the possibility of running object decks through Model-20 terminals have led to specific items of interest later in this Newsletter.

SYSTEM PERFORMANCE MEASUREMENT

The Computer Centre is actively involved in measuring the performance of its computing systems in order to provide a more stable and efficient service to its many users. Since the HASP/MVT system was first installed in April 1 of 1969, questions have been asked about it for which there were no direct answers:

- how many jobs did we run today?
- how many tape mounts do we do in a shift?
- what is the overhead imposed by HASP and OS?
- can we process more jobs than we do currently?
- what is the optimum configuration for speed and efficiency, considering the types of jobs run on our systems?

Such questions could not all be answered with the Operating System as distributed by IBM. HASP does give some statistics via the $STATUS and $BACKLOG commands on the operators console and through an accounting card punched for each job. The number of jobs run daily as published in this Newsletter is via a University of Toronto written accounting system that summarizes the data on these accounting cards. Gradually this facility was expanded to tell us how many jobs we run in each class, etc.

Realizing these shortcomings, we began thinking seriously about modifying OS. The first two modifications were copied from two different installations in the United States (Douglas Aircraft and Martin Marrietta). These brought us the I/O time figure and High Water Mark (maximum region used). Then we started collecting internal OS data to count total number of jobs and steps as well as CPU time, I/O time etc. per shift.

Just about then IBM introduced an OS facility known as SMF (System Management Facilities) to give most of the important data. SMF was not implemented here, however, because: it was not compatible with HASP; it was a permanent feature in the system; we didn't need all of that information all of the time; it was unreliable; it had a tricky data structure; it lost data if the system crashed.

A package from Systems Dimension Limited in Ottawa called Accountpak was then evaluated. Accountpak gave us all the data wanted and more, it was flexible, and it gave software to summarize the collected data (something SMF did not do). We experimented with Accountpak for about 6 months, collecting helpful information on which compilers are used the most (Fortran G, ALGOL, PL1), which data sets are used the most and how much core is wasted. Unfortunately, Accountpak was much too expensive to keep for system measurement purposes and was too oriented toward SDL's own accounting philosophy.

Currently we are making use of a software package from the University of Guelph to analyze the punched accounting cards more thoroughly. This is telling us things like:

- 10% of our jobs have JCL errors.
- 94% of our jobs are under 3 minutes charge.
- fewer jobs are run on Monday than any other weekday.

The heavy users, in the sense of charge time per job, may be identified. We hope to have a facility soon to assist these heavy CPU users in making their code as efficient as possible.

The most sophisticated software tool at the moment is a package purchased from the Computer Centre at the Stanford Linear Accelerator (SLAC). This package summarizes and analyzes collected information both on the operators console and on the printers. It could be run all day (if we wish) to tell us how much our disks and tapes are used and how much core is idle, e.g., we found that for 70% of the time on System #1 there is 70K available.

A HASP SNOOPER tool is being introduced to tell about the printing, punching and execution queues at any time. This type of information will help us to be able to generate a system better suited to the users' jobs.

In December of 1970, we acquired the use of a device known as a Hardware Monitor for the month. This unit is shared cooperatively by all fourteen university centres in Ontario through the Computer Coordination Group. We will be receiving the unit on rotation from time to time. The next scheduled use at UTCC is in June. A hardware monitor is a logical device that is physically wired to the various components of a system (CPU, tapes, disks, core storage etc.) to measure and record the activity of these devices. For instance, we found that CPU utilization on System #2 before we got the new core box of 256K was about 35% busy. After installing the core and increasing the number of jobs we could multiprogram, this figure went up to about 70% busy. We found CPU utilization on System #1 to be around 65% busy. One half of this is attributed to the Operating System. Tape usage ranges from 5% to 35% busy during the day shift.

We discovered that the Arts and Sciences Undergraduate Terminal was configured poorly, causing a heavy load on one channel. This has since been corrected by moving the line from the fast selector channel to the Multiplexor channel.

The important feature of hardware monitors as opposed to software monitors is their lack of influence on the running system. Software Monitors (Programs) take up core, CPU, I/O time, therefore affecting what they are monitoring. Hardware monitors are passive. The advantages of hardware monitors (easy implementation, no overhead, thorough data) has made us want to have a unit around permanently.

Since the CCG monitor is available periodically, UTCC ought not to purchase an expensive (up to $50,000) commercial monitor. So we are constructing our own, based on a machine built at the University of Waterloo.

The Computer Research Facility has graciously consented to make work space and advice available through their involvement in component construction in the past. We expect to complete four of these units (one for Waterloo, one for CRF and two for UTCC (System #1 and System #2)) this year.

Useful information is now surfacing from these monitoring efforts. We expect to use the data to maintain a better system today and to plan for new systems in the future. The user community will benefit from these studies through better turnaround and throughput in the coming months.

TRANSPARENCY FEATURE FOR REMOTE TERMINALS

A suggestion has been made that the transparency feature be incorporated into the remote Model 20 terminals. The feature has been ordered for the New Physics, and Arts and Science terminals. The addition of this feature to these terminals is a straightforward technical matter and will benefit the users by permitting them to submit object decks from those locations. This will eliminate certain obvious problems and provide some equally obvious improvements in efficiency to the user and to the number of jobs the terminal can handle.

Four Model 20 terminals were originally installed in the University of Toronto. The communication technique originally supported by IBM is called Synchronous Transmit and Receive (STR). Not long ago, two of the terminals were upgraded to make use of a newer transmission technique called Binary Synchronous Communication (BSC). Only with the BSC technique can the transparency feature be incorporated. This feature permits a full range of 8-bit EBCDIC characters to be passed across the communication lines. Without transparency certain of these characters are reserved as control characters and it is this which inhibits the use of the S/360 form of object deck.

There are a variety of practical difficulties in adding the transparency feature to the Model 20's at Erindale and Scarborough. These problems include issues concerned with the purchase or rental status of the equipment and with the telecommunication interface hardware at the Computer Centre itself. It is practical, however, to make the upgrade on the New Physics, and Arts and Science machines. The feature should become available by mid-summer.

NEWSLETTER ERRATA CORRECTED BY SYSTEM STATUS BULLETINS

Certain errors in UTCC Newsletters have been corrected by System Status Bulletins. Here is a summary of those errors so that the corresponding SSB's can be cancelled.

Newsletter #59

"Overriding Output Class Specification in Catalogued Procedures" - error noted - corrected by SSB #61:69
The second card in the given procedure should read:

```
//FORT.SYSPRINT DD DDNAME=myname  (overriding
                                         card)
```

Newsletter #69

"Use of File-Protected Tapes in FORTRAN Programs" - error corrected - noted in SSB #60:70:2

The LABEL parameter should be:

```
LABEL=(1,SL,,IN)
```

Newsletter #72

"ALGOL W Processor Now Available" error corrected - noted in SSB #2:71:2

The name of the ALGOL W compile, link-edit and go procedure is ALGOWCLG.

Newsletter #73

"LMODMAP Service Aid" - error corrected - noted in SSB #10:71:2

The JCL required to use LMODMAP is as follows:

```
//  JØB
//JØBLIB  DD  DSNAME=IC.MTCB.LINKLIB,DISP=SHR
//S1  EXEC  PGM=LMØDMAP
//SYSPRINT DD  SYSØUT=A
//DD1  DD  DSNAME=name(member),UNIT=2314,
//  DISP=ØLD,VØLUME=SER=serial
/*
//
```

The above JCL for LMODMAP is also correct as given in March 1 revision to the Users' Reference Manual (Section 6.2).

Newsletter #73

"Optimization with the FORTRAN H Compiler" error corrected - noted in SSB #12:71:3

The last line but one on Page 20 should read: A=Y2(I) where I=11

SSB's IN EFFECT AT APRIL 15, 1971

1:70:1	Tape Assignments for DATATEXT Batch (7094)
8:70:2	APL/360 Service
14:70:2	7094 Library Subroutine ALGAMA
58:70	Problems in FORTRAN Compilers
4:71:1	Large FORTRAN H Compiler on System #1
6:71:1	HSJS Region Change
6:71:2	SPARTA Package added to WATLIB
8:71	New Format for CPS/RJE Jobname
9:71:2	Use of REGION Parameter
11:71:1	Larger WATFOR for HSJS
11:71:2	PL/I Version 5
11:71:3	SSP-III Subroutines BESJ and EIGEN
11:71:4	ALGOL W 305 Abends
12:71:2	IEHLIST Problems with FORMAT Parameter
13:71	Revised Version of SPEC
14:71:1	IEBPTPCH Problem
14:71:4	Error in 13:71
15:71	Problems with HSJS Processors
16:71:1	Updated Version of WATFIV for Batch Users
16:71:2	EUT/ASUT Assembler G Users
16:71:3	CPS/RJE Card Image Problems
17:71	Improved Authorization Code Checker
18:71	EUT/ASUT WATFIV
19:71:1	DDP Package Added to WATLIB
21:71	Waterloo WATLIB
22:71:1	Revised Defaults for Line and Card Estimates on Job Card
:2	New Compile and Compile-linkedit Procedures for PL/I Version 5

RECENT ACQUISITIONS IN THE DEPARTMENT OF COMPUTER SCIENCE LIBRARY

Arden, B. W. and Astill, K. N.
Numerical algorithms: origins and applications. 1970.

Batchelder, Paul Mason.
An introduction to linear difference equations. 1967.

Bongard, Mikhail Moiseevich.
Pattern recognition. 1970.

Computer Usage Company, Inc., New York.
Computer Usage/360 FORTRAN programming. Ed. by E. A. Weiss. 1969.

Conference on Data Systems Languages. Systems Committee.
A Survey of generalized data base management systems. 1969.

Conference on Graph Theory, Western Michigan University, 1968.
The many facets of graph theory, ed. by G. Chartrand and S. F. Kapoor. 1969.

Emshoff, James R. and Sisson, R. L.
Design and use of computer simulation models. 1970.

Geddes, Keith O.
Rational approximation in the complex plane. 1970.

Gruenberger, Fred, ed.
Fourth generation computers: user requirements and transition. 1970.

Hiob, Heinz. (M.Sc. thesis)
An interpreter/simulator for testing supervisor programs. 1970.

Householder, A. S.
The numerical treatment of a single nonlinear equation. 1970.

International Federation for Information Processing. Danish I.A.G. Group.
File orgainzation: selected papers on FILE 68, Helsingor, November, 1968.

Moon, J. W.
Counting labelled trees. 1970.

Oberman, R. M. M.
Disciplines in combinational and sequential circuit design. 1970.

Symposium on Critical Factors in Data Management, U.C.L.A., 1968.
Critical factors in data management. Ed. by F. Gruenberger. 1969.

Toronto. University. Computer Centre.
Users' Reference Manual. Ed. by Jan Stewart. 1971.

Van Raamsdonk, R. J.
The representation of three dimensional objects as fleshed out stick figures.
Toronto, University. 1971. (M.Sc. thesis)

Vazsonyi, A.
Problem solving by digital computers with PL/1 programming. 1970.

Walker, Terry M. and Cotterman, W. W.
An introduction to computer science and algorithmic processes. 1970.

Wyman, F. P.
Simulation modeling: a guide to using SIMSCRIPT. 1970.

DATA ACQUISITION COMPUTER AVAILABLE

Since early 1967 the High Energy Physics group has used a Control Data 1700 computer system to collect data from precision measurements of bubble chamber film. The CDC 1700 also performs detailed legality checks on the data as well as an extensive analysis of the accuracy of the measurement. Additional data and control information is exchanged between the computer and the measuring machine operator by means of three time-shared typewriters.

The High Energy Physics group will be transferring their operation to a high speed semi-automatic system and will terminate their use of the CDC 1700 within the next two months. Anyone interested in making use of this facility or taking it over completely should contact Dr. E. C. West at 928-2950.

The detailed configuration of the system is as follows:

Memory:	16,384 16-bit words (1.1 usec)
Console Teletype:	KSR-35
Paper Tape Reader:	300 frames/sec
Paper Tape Punch:	60 frames/sec
Magnetic Tape:	7-track
Disk Pack Drive:	1,536,000 words
Software:	FORTRAN compiler and run-time library

THE WATFIV PROCESSOR FOR THE HIGH SPEED JOB STREAM

The WATFIV Compiler announced in System Status Bulletin 18:71 is a UTCC modification to the standard WATFIV VIL2 Compiler from the University of Waterloo. The standard WATFIV VIL2 Compiler is described in '/360 WATFIV Implementation Guide' published by the University of Waterloo and the WATFIV Language is fully described in 'FORTRAN IV with WATFOR and WATFIV' by Cress, Dirksen and Graham, published by Prentice-Hall. The latter publication fully describes the WATFIV restrictions, additional features and incompatabilities between WATFOR and WATFIV.

WATFIV Control Cards

The following two control cards are required to run a WATFIV job in the University of Toronto High Speed Job Stream.

```
1      7-21  23-29  40-43  46-48
$JOBW  name   code   time  lines

   WATFIV Job

$DATA

   data as required
```

where:		
	name	is the programmer's name
	code	is the authorization code
	time	is the execution time estimate in seconds and tenths, the default is 3 seconds and the maximum is 10 seconds
	lines	is the execution line estimate in 100's of lines, the default is 60 lines and the maximum is 300 lines

The $DATA control card should always be included even if there are no data.

Two other control cards are also recognized by WATFIV and they are:-

$PRINTOFF	stops the listing of the source cards following
$PRINTON	source cards following this are listed

Other Specifications and Restrictions

- The page limit for WATFIV execution output is 8 pages.
- The EUT/ASUT WATFIV Compiler is dynamic and provides for a user work space of slightly less than 45K.

- The EBCDIC character set should be used. However, mixed decks can be used but apostrophe (') can only be used for Hollerith Constants. EBCDIC + is the only plus sign allowed. BCD + and EBCDIC & are taken as the statement number argument indicator.

- $ISNON,$ISNOFF,$CHECK,$NOCHECK,$WARN,$NOWARN control cards are not supported.

- Object decks are not allowed in the input stream.

- The WATFIV direct access I/O feature is not supported and any attempt to use this feature will result in the following error message:-

  AC-5 'ATTEMPT TO USE DIRECT ACCESS I/O-FEATURE INHIBITED'

- The WATFIV pages exceeded error message has been changed to read:-

  UN-7 'OUT OF LINES/PAGES'

- Arguments which are arrays, when passed to subprogram parameters, are treated differently than by WATFOR. In particular WATFIV uses the dimensions declared for the dummy array in the called subprogram. This implies that results will be different under WATFOR and WATFIV if the dimensions of the dummy array differ from those of the actual array passed.

- The WATFIV WATLIB contains the random number generators RANDU, GAUSS but WATFIV does not support the SPARTA package.

FORTHCOMING COMPUTER CENTRE COURSES

Statistical Package for the Social Sciences (SPSS)

SPSS is a programming language designed to assist the social scientist in performing many types of statistical analyses on his data. The Computer Centre is supporting this package for S/360 users and is now giving a workshop style course on it. The first one is scheduled for Monday May 10, Wednesday May 12, Friday May 14, Monday May 17, Wednesday May 19 and Friday May 21, from 3 to 4 p.m. It will be held in Room 101 of the Sandford Fleming Building.

No prerequisites are required for this course, but a knowledge of commonly used statistical processes and some exposure to computer programming will be helpful. Interested persons are asked to register with either Mr. A. Kowaliw in Room S.F. 130 (phone 928-8701) or Miss W. Kiernander, Room S. F. 128 (phone 928-

2694). The first course will be limited to 35 people but additional courses will be scheduled if the demand is sufficient to justify them.

York FORTRAN Series

The Centre has now acquired a set of filmed lectures produced by York University which covers FORTRAN (including some WATFIV features). These films will be used for future FORTRAN lectures given by the Centre. As before, the FORTRAN lectures will be unrestricted and advertised in Varsity and the Staff Bulletin.

Edutronics Films and Video Tapes

The agreement between the Computer Coordination Group (C.C.G.) of the Committee of Presidents of the Universities of Ontario and Edutronics, which was discussed in the March Newsletter, has now been finalized. A schedule of tapes and films to be borrowed by the Centre for the next four months has been submitted to the C.C.G. If it is accepted tapes and films will be available at the Centre as follows:

May:	Tools	An introductory series of films on some basic concepts and uses of computers. Primarily for people interested in computers, but with no previous experience.
	O/S Overview	An introduction to Operating System/360 and a discussion of its basic facilities. This series together with the one on JCL should be of interest to all users of our general purpose job stream facilities who wish to improve their ability to cope with JCL.
	Techniques	This series of tapes discusses the linkage-editor, especially its overlay feature and modular programming. This should be of interest to more advanced programmers.
June:	O/S Overview	As above
	JCL (Part 1)	Job Control Language; this section will cover the JOB and EXEC statements and part of the data definition (DD) statement. The overview and JCL series are highly recommended for all serious users of our general purpose job stream facility.

July:	JCL (Part 2)	The rest of the DD statement plus some sample jobs and a practice problem.
	Dumps	How to analyse dumps produced by O/S 360. Again, for more advanced users.
	Sequential Files	
August:	Utilities	This part covers such utility programs as IEHPROGM, IEHMOVE, IEHLIST, IEBCOPY, IEBPTPCH, IEBGENER and IEBUPDTE. These are the programs used most commonly by application programmers.
	Debugging Common Errors	This series should be of interest to all users!
	Direct Access Files	

These films and tapes will be available for viewing by individual users or groups of users who wish to see them. It is hoped that more formal showings can be arranged but this will depend upon the availability of Computer Centre staff who can back them up. As yet, we have only seen selected sections of this material and will need some time to view the complete series before we can give an adequately supported course.

In the meantime, users wishing to view these films or tapes should contact either Mrs. C. Davidson, S. F. Room 115A (phone 928-8599) or Mr. R. Williams, S. F. Room 128 (phone 928-2694).

PROCEDURES FOR USE WITH COMPLEX MATRICES

In recent years, considerable progress has been made in producing algorithms for solving systems of complex linear equations, calculating inverses and finding eigensystems for general complex matrices. Mr. I . Farkas of the Department of Computer Science has kindly offered to translate some of these algorithms, which have been published in ALGOL-60, into FORTRAN for use on the S/360. If sufficient interest is shown in this project we would like to take up Mr. Farkas' offer and incorporate the subroutines in ICSLIB. Persons having the need for such routines or who anticipate the need in the future are asked to contact Mr. Rene Lemmens, Room 130 of the Sandford Fleming Building, phone 928-8701.

NEW SUBROUTINES IN ICS LIBRARY

Two new subroutines have been added to the ICS library. The load modules are in IC.ICSLIB on TIC022, while the source modules are in IC.ICSLIBS on TIC032.

These subroutines together are recommended over the subroutine JACOBI.

The routines were presented to USG by Mr. I. Farkas of the Department of Computer Science.

TQL2	To calculate all the eigenvalues and eigenvectors of a real tridiagonal matrix (using the QR transformation).
TRED2	To reduce a real symmetric matrix to tridiagonal form. (by Householder reductions).

Writeups of these subroutines can be obtained from R. Lemmens, Room 130 of the Sandford Fleming Building, (phone 928-8701).

NOTE ABOUT THE QR ALGORITHM

The Householder reduction and the QR algorithm (H&QR) recovers the eigensystem of a real symmetric matrix three to five times faster, and considerably more accurately than Jacobi's method. When H & QR is in double precision and Jacobi in single precision, H & QR recovers the eigensystem of a real symmetric matrix in about half the time of that of Jacobi.

SPECIAL PRINTER FORMS

The Computer Centre now has available blank printer paper for users requiring such. For completeness, all the special forms parameters are listed below (see Users' Reference Manual for further details).

1 - blank 1 part 11x15 paper
2 - lined 2 part 11x15 paper
3 - lined 3 part 11x15 paper
4 - lined 4 part 11x15 paper
5 - standard address labels
X - identification number of user supplied special forms, where $X \geq 20$

Please note that the special forms parameter 1 previously meant the reverse side of lined 1 part 11x15 paper.

PRODUCTION DATA

The usual March peak in terms of jobs processed occurred again this year. Table I illustrates. All services were busier, with general purpose S/360 work rising conspicuously. The extra core memory installed earlier this year has in this month shown its worth, since turnaround quality remained good despite the increase in load.

Table II shows the continuing growth of S/360 service compared to March 1970. Suprisingly, the High Speed Job Stream volume remained level. The cause or significance of this will receive closer study in coming months.

SYSTEM	JAN	FEB	MAR	MAR/FEB CHANGE
S/360	16536	16444	23864	+45%
7094	1533	1042	1690	+62%
HSJS	58527	65888	78834	+20%
TOTAL	76596	83374	104388	+25%

TABLE I: Number of Jobs Processed; Jan, Feb, Mar, 71.

SYSTEM	MAR 70	MAR 71	70/71 CHANGE
S/360	16154	23864	+48%
7094	3840	1690	-56%
HSJS	78949	78834	- 0%
TOTAL	98943	104388	+ 6%

TABLE II: Number of Jobs Processed, Mar 70 and Mar 71.

COLUMN BINARY CARD TO TAPE

Users requiring to input Column Binary cards to the 360/65 or wishing to create a Column Binary input data tape for the 7094 can now accomplish this via the 360/65 system. For more information or to schedule a Binary Card -to-tape job, contact the Chief Operator, D. Tough at 928-5058 or Sandford Fleming Building, Room 112.

USE OF SPEC INSTEAD OF THE SPECIAL REQUEST FORM

A recent study indicated that only 16% of setup jobs in the general OS job stream used the program SPEC (SSB's 5:71 and 13:71) to obviate the Special Request Form. Its users are happy. We suggest you look it up and try it. See your SSB file or obtain copies from the Users' Service Group.

CONVERSATIONAL PROGRAMMING SYSTEM - REMOTE JOB ENTRY

A "Sample Session Guide" illustrating the use of CPS-RJE may be obtained from Mrs. C. Pidcock, Room 103, Sandford Fleming Building (928-8703). Questions and/or suggestions concerning this guide may be directed to the Interactive Systems Group at 928-3787.

ADMINISTRATIVE TERMINAL SYSTEM

Instructions pertaining to the use of High Speed Input/Output Operations (magnetic tape, printer) for ATS documents may be obtained form Mrs. C. Pidcock, Room 103, Sandford Fleming Building (928-8703). Questions and/or suggestions concerning the use of High Speed I/O with ATS may be directed to the Interactive Systems Group at 928-3787.

ATS/360 SIGN-ON PROCEDURE

ATS/360 can be accessed by EBCD (PL/I keyboard) and CORRESPONDENCE (standard Selectric keyboard) terminals. When sign-on is initiated, by striking the RETURN key, the message for EBCD terminals appears first. On an EBCD terminal, this message will be readable but not on a CORRESPONDENCE terminal. To notify ATS/360 that you are using a CORRESPONDENCE terminal, strike the RETURN key again and the sign-on message will appear in readable form. At this point, follow the normal sign-on procedure described in the Terminal Operator's Manual (or Terminal Operator's Quick Reference Guide).

ACTIVITIES IN THE 7094 PRODUCTION AREA

Productivity and turnaround of the 7094/1401 system suffered throughout March from both preventable and catastrophic causes. The latter have included hardware failures of both the 7094 and the 1401, and a collection of software-type failures, particularly with the Datatext package. At least 4 bugs have been isolated in Datatext, two of which can be handled by operator intervention.

New procedures and priorities have been introduced for batch operations within the past week with very gratifying results. Early in the day, short job turnaround is now near the one-hour goal. With only two exceptions during the past month, any job submitted during one day is complete before 9:00 A.M. the next day.

A Suggestion Box located in the input area is noted for its empty condition.

Weekend service, while not as instant as might be wished, has been provided when required.

CREDIT REQUEST SUMMARY

The total activity in all systems was up substantially in March but we were able to reduce the relative incidence of causes for credit requests. Table I illustrates, with the comparative February totals along side.

			This Month	Last Month
	S/360	7094	Total	Total
HUMAN	44	3	47	55
SOFTWARE	7	7	14	22
HARDWARE	4	7	11	11
TOTAL	55	17	72	88
	Percent of Jobs		0.3%	0.5%

TABLE I: Causes for Credit Requests

	No. of Cases	
	This Month	Last Month
HUMAN ERROR		
1. User deck lost	1	-
2. 7094 Datatext operation error	2	4
TOTAL	3	4
SOFTWARE ERROR		
1. Job trying to write on input tape (transient)	3	-
2. IBSYS software error	1	2
3. Datatext software error	1	-
4. Monitor over-write	2	2
5. Clock error	-	1
TOTAL	7	5
HARDWARE ERROR		
1. Tape errors	3	6
2. Card reader errors	3	2
3. 7094 hardware error	1	-
TOTAL	7	8
OVERALL TOTAL	17	17

TABLE III: 7094 Credit Request Summary

Tables II and III illustrate the principal sources of claims in the S/360 and 7094 areas.

	No. of Cases	
	This Month	Last Month
HUMAN FACTORS		
1. Lost output of all types	12	23
2. Cards shuffled at the card reader	5	3
3. Invalid USG advice	4	1
4. Lack of SYSDA and SYSSQ scratch space	4	4
5. Magnetic tape not found in Machine Room	3	-
6. CALCOMP dataset full or not created	3	-
7. Operator error involving printer control	4	15
8. All other causes	9	15
TOTAL	44	51
SOFTWARE ERROR		
1. Job ran in LCS	2	7
2. Miscellaneous OS and utility bugs	4	8
3. User job in system between steps when system crashed	1	2
TOTAL	7	17
HARDWARE ERRORS		
1. Unit record equipment problems	2	3
2. Program failure due to machine error	1	-
3. CPU apparently running slowly executing user job - cannot recreate	1	-
TOTAL	4	3
OVERALL TOTAL/360	55	71

TABLE II: System 360 Credit Request Summary

TECHNICAL TIPS

USING ON-LINE SUBPROGRAM LIBRARIES (TIC014/TIC069)

1. Obtaining Authorization For On-Line Storage

Any use of space on user-dedicated, on-line packs must be registered with the Authorization Services Section of UTCC (see p. 3-27 ff. of the Users' Reference Manual). After authorization has been received, USG will allocate the requested amount of space on the on-line pack.

2. Adding/Replacing an Individual Subprogram

Use a catalogued compile and link-edit procedure and, as shown below, specify linkage editor options and override the SYSLMOD DD card.

```
//stepname EXEC procname,PARM.LKED=(LIST,NCAL,LET)


//LKED.SYSLMOD DD DSN=name(member),DISP=OLD,
// UNIT=2314,VOL=SER=serialDCB=(RECFM=U,BLKSIZE=7294),
// SPACE=blank
```

In the above and the following example, 'name' should be replaced by the name given to the partitioned data set when authorization was received to use the space, 'member' should be replaced by the name given to the subprogram, and 'blank' indicates that no operands are to be coded after the '=' sign. The load module from the above will contain only the subprogram. Only one compiled program can be added/replaced at a time using the above JCL.

3. Calling Subprogram Load Modules From a Library

The following illustrates how to use the subprogram library. In this example, it is assumed that the main program which calls the subprograms is a FORTRAN source module which must be compiled. The subprogram library itself is concatenated with the SYSLIB DD card.

```
//stepname EXEC FORTGCLG
//FORT.SYSIN DD *
     )
     ) source deck of FORTRAN main program
     )
/*
//LKED.SYSLIB DD
```

(cont'd)

```
// DD DSN=name,DISP=OLD,
// UNIT=2314,VOL=SER=serial
```

SYSTEM 360 OPERATING SYSTEM SORT/MERGE

The following is a list of the catalogued procedures for sorting available in this installation. For detailed description of sort and merge operation refer to the publication IBM/360 Operating System GC28-6543-5.

SORT:	A general sort program. It can be used for simple sorts or sort/merge applications that require link editing of modification routines. However, for simple sorts it is an inefficient method.
SORTD:	For simple sorts either the SORTD or SORTER procedures should be used. SORTD cannot be used for applications having modification routines that need link editing.
SORTER:	This procedure is used for straight sorting of large amounts of data. The catalogue procedure provides DD cards for enough intermediate storage area. The amount of intermediate work area is handled by a parameter CYLS on the exec card. The default option of CYLS (No. of cylinders) is 2. It can be increased for larger data. This procedure is comparatively easy to handle as the catalogued procedure supplies most of the DD cards.

Examples of the uses of SORT, SORTD and SORTER procedures:

To sort 16000 card images on tape, the card fields to be sorted are columns 1-4, 30-31.

a. SORT

```
//SRT   EXEC    SORT
//SORTIN  DD    UNIT=2400,DSN=name,VOL=SER=serial,
//  DISP=OLD,DCB=(RECFM=FB,LRECL=80,BLKSIZE=2000),
//          LABEL=(1,SL)
//SORTOUT  DD  UNIT=2400,DSN=name,VOL=SER=serial,
//  DISP=(NEW,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=2000),
//          LABEL=(1,SL)
//SORTWK01  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SORTWK02  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SORTWK03  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SORTWK04  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SORTWK05  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SORTWK06  DD  UNIT=SYSDA,SPACE=(TRK,(100),,CONTIG)
//SYSIN  DD  *
  SORT FIELDS=(1,4,CH,A,30,2,CH,A),SIZE=E16000
/*
```

b. SORTD

Same as in SORT procedure except the EXEC card should be replaced by:

```
//SRTD  EXEC  SORTD
```

c. SORTER

```
//SRTR  EXEC  SORTER,CYLS=2
//SORTIN  DD  UNIT=2400,DSN=name,VOL=SER=serial,
//  DISP=OLD,DCB=(RECFM=FB,LRECL=80,BLKSIZE=2000),
//  LABEL=(1,SL)
//SORTOUT  DD  UNIT=2400,SDN=name,VOL=SER=serial,
//  DISP=(NEW,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=2000),
//  LABEL=(1,SL)
//SYSIN  DD  *
  SORT FIELDS=(1,4,CH,A,30,2,CH,A),SIZE=E16000
/*
```

2314 Intermediate Storage Estimate Technique

Approximate total number of tracks T required are determined by the following formula:

$$T = \frac{1.25S}{K}$$

where S is the number of records in the input set, either actual or approximate.

$$K = B/L$$

where B is 7000
L is the number of bytes in each record in the input data set. Use only the integer portion of K.

Divide T among six data sets. Let K be 240. In this case the total number of cylinders required is:

$$240/20 = 12$$

Therefore, each of data sets SORTWK01 -SORTWK06 receives 2 cylinders.